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| 10/063,224   | 04/01/2002  | Mathew Sommers       | GLO 2 0096           | 9509             |
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| FAY, SHARPE, FAGAN, MINNICH & MCKEE, LLP<br>1100 SUPERIOR AVENUE, SEVENTH FLOOR<br>CLEVELAND, OH 44114 |             |                      | SAWHNEY, HARGOBIND S |                  |
|  |             |                      | ART UNIT             | PAPER NUMBER     |
|  |             |                      | 2875                 |                  |

DATE MAILED: 12/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/063,224

Applicant(s)

SOMMERS ET AL.

Examiner

Hargobind S Sawhney

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-9 and 11-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 11-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. The amendment filed August 29, 2003 has been entered. Accordingly:
  - The specification has been revised;
  - Claim 10 has been cancelled; and
  - Claims 1, 11, 12, 16-20, 23 and 25 have been amended.

### ***Allowable Subject Matter***

2. The indicated allowability of claims 11, 14 and 18-22 is withdrawn in view of the newly discovered reference(s) including Johnson (US Patent No.: 3,774,021) and Wu (US Patent No.: 6,036,336). Rejections based on the newly cited reference(s) follow.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art admitted by the applicant – hereafter referred as the prior art in this office action- in view of Zhang (US Patent Application Pub. No.: US 2002/0021573 A1) and Johnson (US Patent No.: 3,774,021).

Regarding Claim 1, the prior art discloses a traffic signal ball 10 (Figure 1, Para. 0002) comprising:

- an incandescent lamp 12 (Figure 1, Para. 0002) including a threaded electrical connector 16 (Figure 1, Para. 0002); and
- an optical system - including a parabolic reflector 22 and a lens 24 (Figure 1, Para. 0002) receiving light from the incandescent lamp 12, and forming at least a portion of the received light into outwardly directed light beam (Figure 1, Para. 0002).

However, the prior art does not teach:

- a lamp including a plurality of Light Emitting Diodes (LEDs), a threaded electrical connector and an optical element dispersing forwardly directed light produced by the LED lamp;
- the optical system being partially reflective and partially transmissive.

On the other hand, Zhang (US Patent Application Pub. No.: US 2002/0021573 A1) discloses a lighting device comprising an LED lamp (Figures 3.1 and 4.1) including:

- a plurality of LEDs 1 and a threaded electrical connector 5 (Figures 3.1 and 4.1, Para. 0092); and

- an optical element 2 (Figures 3.1 and 4.1, Para. 0092) dispersing – optical element with diffused surface (Paragraph 0091, lines 9 and 10) - forwardly directed light produced by the LEDs 1 (Figures 3.1 and 4.1, Para. 0092).

It would be have been obvious to one of ordinary skill in the art at the time of the invention to modify the traffic signal ball of the prior art by replacing the incandescent lamp with the LED lamp as taught by Zhang for benefit and advantage of providing a device having high energy efficiency, long operating life and low maintenance cost.

Further, on the other hand, Johnson ('021) discloses a light-emitting device comprising an optical system 10 (Figure 1, column 1, line 49) including element 17 being partially reflective and partially transmissive (Figure 1, column 2, lines 6-13 and 24-29)

It would be have been obvious to one of ordinary skill in the art at the time of the invention to modify the traffic signal ball of the prior art in view of Zhang by providing the reflective and transmissive element as taught by Johnson ('021) for benefit and advantage of providing a device with directing and spreading light with less number of light emitting sources (LEDs).

Regarding Claims 2-5, the prior art in view of Zhang (US Patent Application Pub. No.: US 2002/0021573 A1) and Johnson ('021) additionally teaches:

- the optical system - including a parabolic reflector 22 receiving and substantially collimating at least a portion of the dispersed light (Prior art, Figure 1, Para. 0002);

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- a lens 24 receiving collimated light from the parabolic reflector (Prior art, Figure 1, Para. 0002);
- the lens 24 being tinted, and spectrally filtering the light beam (Figure 1, Para. 0003); and
- The optical system being operative with an incandescent light bulb 12 (Prior art, Figure 1, Para. 0002).

Regarding claims 6-9, the prior art in view of Zhang (US Patent Application Pub. No.: US 2002/0021573 A1) and Johnson ('021) obviously meets the method limitations of claims 6-8 with the teaching of:

- a lamp including a plurality of Light Emitting Diodes (LEDs) 1 (Zhang, Figures 3.1 and 4.1, Para. 0092);
- a threaded electrical connector 5 (Zhang, Figures 3.1 and 4.1, Para. 0092); a threaded socket 16 (the prior art admitted by the applicant, Figure 1, Para. 0002);
- power feeding cables 20 (the prior art, Figure 1, Para. 0002); an optical element 2 (Zhang, Figures 3.1 and 4.1, Para. 0092) directing forwardly directed light produced by the LED lamp;
- a heat sink 3 (Zhang, Figures 3.1 and 4.1, Para. 0092) removing the heat from the LED lamp 1;
- an electrical conditioning circuit 4 receiving power from the threaded electrical connector, and conditioning it to the electrical power for the LED lamp (Zhang, Figures 3.1 and 4.1, Para. 0094 and Para. 0093 and 0103);

- the LEDs 1 powered through the threaded socket, and producing white light – blue LEDs covered with a layer of fluorescent material - (Zhang, Figures 3.1 and 4.1, Para. 0095); and
- the LEDs 1 powered through the threaded socket, and producing red light (Zhang, Figures 3.1 and 4.1, Para. 0095).

It would be have been obvious to one of ordinary skill in the art at the time of the invention to meet the method limitations by applying combined teaching of the prior art and Zhang.

5. Claims 11-17 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art admitted by the applicant in view of Terlep (US Patent No.: 5,594,433) and Zhang (US Patent Application Pub. No.: US 2002/0021573 A1).

Regarding claim 11, the prior art (instant application, paragraphs 0002-0004) discloses a traffic signal lamp 10 (Figure 1, Para. 0002) comprising an incandescent light bulb 12 (Figure 1, Para. 0002) electrically powered through a threaded type socket connector 18 (Figure 1, Para. 0002).

However, the prior art does not teach an LED-based light source including;

- at least one LED and a screw-based electrical connector compatible for a threaded socket;
- the screw-based electrical connector transmitting electrical power to the at least one LED;
- a reflector cooperating with the at least one LED, and reflecting the LED light to an optic of the traffic signal lamp; and

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- a heat sink removing the heat from the LED lamp;

On the other hand, Terlep ('433) discloses an omni directional LED lamp 100 (Figure 2B) comprising:

- at least one LED 110 (Figure 2B, column 3, line 42) and a bayonet base electrical connector 102 (Figure 2B, column 3, line 63);
- a reflector 115 (Figure 2B, column 3, line 67) cooperating with the at least one LED 110, and reflecting the LED light.

However, regarding Claim 11, Terlep ('433) teaches the at least one LED source including a bayonet base instead of a screw-based electrical connector compatible for a threaded socket which is well known in the art.

On the other hand, regarding Claim 11, Zhang (US Patent Application Pub. No.: US 2002/0021573 A1) discloses a lighting device comprising an LED lamp (Figures 3.1 and 4.1) including a threaded electrical connector 5 (Figures 3.1 and 4.1, Para. 0092) compatible for a threaded socket. In addition, Zhang (US Patent Application Pub. No.: US 2002/0021573 A1) teaches a heat sink 3 removing the heat from the LED lamp 1 (Zhang, Figures 3.1 and 4.1, Para. 0092).

Thus, regarding Claim 11, it would be have been obvious to one of ordinary skill in the art at the time of the invention to modify the traffic signal ball of the prior art by:

- replacing the incandescent lamp with the LED lamp as taught Terlep ('433) by for benefit and advantage of proving a device having high energy efficiency, long operating life and low maintenance cost;



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- further modifying the LED lamp of Terlap with the screw-type base as taught by Zhang (US Patent Application Pub. No.: US 2002/0021573 A1) for the benefit and advantage of improving the applicability of the light source for retrofitting traffic signal lights; and
- further modifying the LED lamp of Terlap by providing a heat sink as taught by Zhang (US Patent Application Pub. No.: US 2002/0021573 A1) for the benefit of maintaining high operational efficiency by removing heat generated by the LEDs.

Regarding claims 12-17, the prior art admitted by the applicant in view of Terlep ('433) and Zhang (US Patent Application Pub. No.: US 2002/0021573 A1) further discloses:

- the reflector 115 (Figure 2B, column 3, line 67) additionally including:
  - a light transmissive encapsulant 117 (Terlep, Figure 2, column 3, line 67 and column 4, lines 1 and 2) surrounding the at least one LED 110, and having a surface defining the reflector shape 115 (Terlep, Figure 2B);
  - the surface of the reflector shape 115 further including reflective material of metallic coating (Terlep, Figure 2B, column 4, lines 1-4);
  - a depression – cavity element of the reflector 115 – arranged above the at least one LED 110 (Terlep, Figure 2B);
- the at least one LED 110 emitting white light, light produced by blue LEDs covered with a layer of fluorescent material (Zhang, Figures 3.1 and 4.1, Para. 0095), converted into a selected light color while cooperating with

the tinted optical element 24 (prior art admitted in the instant application, Figure 1, Para. 0003); and

- the at least one LED 110 producing red light (Zhang, Figures 3.1 and 4.1, Para. 0095).

Regarding claims 23-25, the prior art admitted by the applicant (instant application, paragraphs 0002-0004) discloses light-producing apparatus 10 (Figure 1, Para. 0002) comprising:

- a socket 18 (Prior art, Figure 1, Para. 0002) holding and powering a lamp 12 (Figure 1, Para. 0002);
- an optical system including a reflector 22 and a lens 24 (Prior art, Figure 1, Para. 0002); and
- the reflector 22 and lens 24 cooperatively directing light outwardly from the light-producing apparatus (Prior art, Figure 1, Para. 0002).

However, the prior art admitted by the applicant does not teach lamp including;

- a plurality of LEDs electronically connected to a connector installing the lamp in a socket of a light producing apparatus;
- a redirection element redirecting light emitted by the LEDs, and optically coupling the redirected into an optical system of the light producing apparatus light ;
- the plurality of LEDs and a screw-based electrical connector compatible for a threaded socket; and

- the connector, the LEDs and the redirecting element comprising a single mechanically rigid apparatus.

On the other hand, Terlep (US Patent No.: 5,594,433) discloses omni directional LED lamp 100 (Figure 2B) comprising:

- a plurality of LEDs 110,120 (Figure 2B, column 3, line 42) and a bayonet base electrical connector 102 (Figure 2B, column 3, line 63); and
- a redirection element 115,125 (Figure 2B, column 3, line 67) redirecting light from the plurality of the plurality LEDs 110,120, and coupling into the optical system 22,24 (the prior art admitted by the applicant, Figure 1, Para. 0002) of the light producing apparatus.

However, Terlep (US Patent No.: 5,594,433) does not teach the electrical connector being a threaded connector compatible for a threaded socket, which is well known in the art.

On the other hand, Zhang (US Patent Application Pub. No.: US 2002/0021573 A1) discloses a lighting device comprising an LED lamp (Figures 3.1 and 4.1) including a threaded electrical connector 5 (Figures 3.1 and 4.1, Para. 0092) compatible for a threaded socket.

It would be have been obvious to one of ordinary skill in the art at the time of the invention to modify the traffic signal ball of the prior art admitted by the applicant by:

- replacing the incandescent lamp with the LED lamp as taught Terlep ('433) by for benefit and advantage of proving a device having high energy efficiency, long operating life and low maintenance cost; and

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- further modifying the LED lamp of Terlep with the screw-type base as taught by Zhang for the benefit and advantage of facilitating retrofitting the light source commonly applicable for traffic signal lights.

Regarding Claim 25, the prior art admitted by the applicant in view of Terlep (US Patent No.: 5,594,433) and Zhang (US Patent Application Pub. No.: US 2002/0021573 A1) discloses the connector 5 (Zhang, Figures 3.1 and 4.1, Para. 0092), the LEDs 110,120 (Terlep, Figure 2B, column 3, line 42) and the redirecting elements 115,125 (Terlep, Figure 2B, column 3, line 67). However, neither combined nor individual teaching of the prior art, Zhang and Terlep teaches the connector, LEDs and redirecting element being assembled into a single rigid apparatus

It would be have been obvious to one of ordinary skill in the art at the time of the invention to assemble the traffic signal ball of the prior art admitted by the applicant with additional modifications as taught by Zhang and Terlep.

6. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art admitted by the applicant in view of Terlep (US Patent No.: 5,594,433) and Zhang (US Patent Application Pub. No.: US 2002/0021573 A1) as applied to claim 11 above, and further in view of Wu (US Patent No.: 6,036,336).

Neither combined nor individual teaching of the prior art, Terlep (US Patent No.: 5,594,433) and Zhang (US Patent Application Pub. No.: US 2002/0021573 A1) teaches the LED-based light source including a masking filter, and at least LED cooperating with the masking filter.

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On the other hand, Wu ('336) discloses an LED retrofitting lamp for illuminated traffic signs comprising LEDs 16 (Figure 2A). Wu ('336) further teaches the LEDs can be colored LEDs or/ and having a colored filter(Figure 2A, column 3, lines 66 and 67).

It would be have been obvious to one of ordinary skill in the art at the time of the invention to modify the traffic signal ball of the prior art admitted by the applicant in view of Terlep ('433) and Zhang (US Patent Application Pub. No.: US 2002/0021573 A1) by providing masking filter as taught by Wu ('336) for the benefit of maintenance cost reduction resulting from stocking and using only one type of LEDs with a desired color filter.

7. Claims 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art admitted by the applicant – hereafter referred as the prior art in this office action- in view of Zhang (US Patent Application Pub. No.: US 2002/0021573 A1).

Regarding claims 19-22, the prior art discloses a traffic signal ball 10 (Figure 1, Para. 0002) comprising:

- an incandescent lamp 12 (Figure 1, Para. 0002) including a threaded electrical connector 16 (Figure 1, Para. 0002); and
- the optical system - including a parabolic reflector 22 receiving and substantially collimating and focusing at least a portion of the dispersed light (Prior art, Figure 1, Para. 0002); and
- a lens 24 (Figure 1, Para. 0002) receiving substantially collimated light.

However, the prior art does not teach the traffic signal ball comprising

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- power converting electronics receiving and converting electrical power for the LEDs;
- a lamp including a plurality of Light Emitting Diodes (LEDs), a threaded electrical connector receiving the converted power electrical power;
- an optical element dispersing forwardly directed light produced by the LED lamp;

On the other hand, regarding claims 19-22, Zhang (US Patent Application Pub. No.: US 2002/0021573 A1) discloses a lighting device comprising a unitary LED lamp (Figures 3.1 and 4.1) including:

- power converting electronics 4 (Figure 3.1, Para. 0091) receiving and converting electrical power for the LEDs;
- a plurality of LEDs 1 and a threaded electrical connector 5 (Figures 3.1 and 4.1, Para. 0092);
- a light dispersing element 2 (Figures 3.1 and 4.1, Para. 0092) dispersing – optical element with diffused surface (Paragraph 0091, lines 9 and 10) – forwardly directed light emanating light from the LEDs (Figures 3.1 and 4.1, Para. 0092); and
- a heat sink 3 removing the heat from the LED lamp 1 (Zhang, Figures 3.1 and 4.1, Para. 0092).

Thus, regarding claims 19-22, it would be have been obvious to one of ordinary skill in the art at the time of the invention to modify the traffic signal ball of the prior art by:

- replacing the incandescent lamp with the LED lamp, and positioning the LED in the focal region lamp as taught by Zhang for benefit and advantage of providing a device having high energy efficiency, long operating life and low maintenance cost.
- providing power converting electronics as taught by Zhang to power LEDs with AC power source, and reduce the size of the device; and
- providing heat sink as taught by Zhang for the benefit maintaining high operational efficiency by removing heat generated by the LEDs.

### **Response to Amendment**

8. Applicant's arguments filed on August 29, 2003 with respect to the 35 U.S.C. 103(a) rejections of claims 1,6,11 and 23 have been fully considered but they are not persuasive.

Argument: The optical element of Zhang does not have does not have the claimed optical properties.

Response: Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art admitted by the applicant in view of Zhang (US Patent Application Pub. No.: US 2002/0021573 A1) and Johnson (US Patent No.: 3,774,021).

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As described in section 4 of this office Action, the new prior art Johnson (US Patent No.: 3,774,021) in combination with the teaching of the prior art admitted by the applicant and Zhang meets the limitations recited in Claim 1.

Argument: Neither "prior art" nor Zhang, taken singularly or in combination, teaches or suggests using a heat-sinking element for controlling the heat generated by the LED light source and electronics.

Response: Claims 6 and 11 recite "a heat sinking element for removing heat from the at least one LED.

The "prior art" teaches a heat sinking element 3 (Zhang, Figures 3.1 and 4.1, Para. 0092) removing the heat from the LED lamp 1. The prior art in view of Zhang teaches retrofitting the lamp with LEDs. The heat-sinking element of the modified lamp would be fully capable of removing heat generated by at least one LED.

Argument: Regarding Claim 23, neither Zhang nor Terlep taken singularly or in combination, teaches or suggests the optical element directing light rays emitted by the LEDs in specific direction to couple to the optical system the light in the required direction.

Response: As described in section 5 of this office action, Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art admitted by the applicant in view of Terlep (US Patent No.:



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5,594,433) and Zhang (US Patent Application Pub. No.: US 2002/0021573 A1).

The "prior art" teaches an optical system including a reflector 22 and a lens 24 (Prior art, Figure 1, Para. 0002) and the reflector 22 and lens 24 cooperatively directing light outwardly from the light-producing apparatus (Prior art, Figure 1, Para. 0002).

Terlep (US Patent No.: 5,594,433) discloses omni directional LED lamp 100 (Figure 2B) comprising redirection elements 115,125 (Figure 2B, column 3, line 67) redirecting light from the plurality of the plurality LEDs 110,120.

Retrofitting the lamp of Terlep in the traffic signal ball of the "prior art" would allow the lamp to direct light rays towards the reflector 22 (Prior art, Figure 1, Para. 0002), which is one of the element of the optical system.

### ***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Lu (U.S. Patent No. 6,488,392 B1), Gartner et al. (U.S. Patent No. 6,054,932), Yan (U.S. Patent No. 5,865,529), Savage Jr. (U.S. Patent No. 4,195,330) and Johnson

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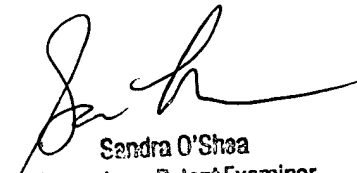
(U.S. Patent No. 3,774,021) each discloses a LED lamp comprising some of the claimed features claimed by the applicant.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hargobind S Sawhney whose telephone number is 703-306-5909. The examiner can normally be reached on 7:30 A.M. to 4:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sandra O'Shea can be reached on 703-305-4939. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-2956.

HSS  
November 13, 2003



Sandra O'Shea  
Supervisory Patent Examiner  
Technology Center 2800